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DO PERFORMANCE AND ENVIRONMENTAL CONDITIONS BEHAVE AS BARRIERS FOR CROSS-COUNTRY BANKING ACTIVITY IN EUROPE?*

Ana Lozano-Vivas[♣] and Jesús Pastor[♠]

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Abstract: Our paper shows how the efficiency scores of the commercial banks of a given European country will change if they decide to move to a different European country. Our experiment is performed over a sample of 700 banks belonging to 11 European countries. We propose to perform a specific analysis for each pair of countries. We consider each time three types of DEA models. The internal model, which considers the banking inputs and outputs and the banks of a single country. The basic model, which considers the same variables as the internal model but the banks of the two countries under study, and the complete model which adds to the basic model the set of environmental variables. These three models allow us to measure the technical as well as the environmental variable gaps between the two considered countries. In this way, we are able to predict the new efficiency score of any bank that decides to operate in a different country. The results indicate, as expected, that being technologically advanced appears to be a significant deterrence to foreign competition and that adverse environmental conditions constitute a real barrier for cross-border banking activity.

Key words: cross-border banking activity, Data Envelopment Analysis

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1. Introduction

The EU's financial sector has attended a gradual increase in policy developments since the 80s. Before that, little activity existed in removing barriers to promote trade in financial sectors. For instance, the Single Market Programme (SMP) with minimal harmonisation and home country control was implemented gradually in the 90s in the banking sector, the insurance and the security markets to facilitate the free movement of services and goods. In particular, for the banking sector, the Second Banking Directive jointly with the directives of own funds and solvency ratio, and more recently the many initiatives within the Financial Services Sector Plan, FSAP, have contributed to create an open banking market in Europe by lessening or eliminating barriers for banking services and by establishing minimum regulatory requirements across EU banking systems. One of the key stated objective of those actions have been to impulse cross-border expansion as well as to foster competition in the European Union's banking activity.

Nowadays and after more than 20 years since the starting time of this process, researchers and policymakers investigate about the slow integration shown by the European banking market, and, in particular, by the retail banking activity. Even if we recognize that many different kinds of reasons (economic, regulatory, or political) could exist to explain this facts, the objective of this paper is to shed some light to the existing research debate about this issue. With a view towards bank performance, we attempt to verify whether better banking technology or worst environmental conditions at the country level act as barriers for the entry of foreign banks in each European banking industry. If this is the case, this could lend a hand to explain the slow pace of cross-border expansion activity, and as a result integration in the European banking markets. Actually, one recent publication of the European Central Bank (ECB, 2007) points out that cross-border banking activities play an important role in fostering progress in banking integration, where the reduction of potential obstacles to develop cross-border banking activity as well as the efficient operation of cross-border institutions will be of vital importance. Explicitly, the cited report states that "*…Identifying and, where possible, reducing barriers to cross-border banking integration is therefore one of the policy priorities for the completion of the single financial market"* (pg. 33).

To cover our goal, we propose to perform a specific analysis for each pair of European countries. We consider each time three types of DEA models, the so called internal, basic and complete model. These three models allow us to measure the technical as well as the environmental variable gaps between the two considered countries. In this way, we are able to predict the new efficiency score of any bank that decides to operate in a different country. The results indicate, as expected, that being technologically good appears to be a significant deterrence to foreign competition and that adverse environmental conditions constitute a real barrier for cross-border banking activities.

Section 2 reviews the available research on cross-border banking comparison. Section 3 presents the methodology used in this paper. The description of the data and the specification of the variables are reported in Section 4. Section 5 presents the empirical results followed by the conclusions in section 6.

2. Cross-country banking efficiency comparisons

Deregulation and liberalisation of the banking market in Europe has been used as the tool for promoting an environment of cross-border competition and banking activity. With a view towards how efficiently the European banks are setting up their products, numerous studies have developed efficiency banking international comparison analysis to measure the efficiency differences among the banking industries of different European countries. Most of the conducted research has been concentrated on the performance of banking sectors in the Western economies (e.g., Casu and Molyneux, 2003; Casu and Girardone, 2006; Barros, Ferreira and Williams, 2007; among others) but recently, the number of papers analyzing the efficiency of banks in the East is growing quickly (e.g., Fries and Taci, 2004; Bonin, Hasan, and Wachtel, 2005; Yildirim and Philippatos, 2007).

Most of those studies use a common efficient frontier to control for the variability in bank performance across nations. That means that any difference in efficiency can be explained by country specific banking technology (Fecher and Pestieu, 1993; Berg, Førsung, Hjalmarsson and Suominen, 1993; Berg, Bukh and Førsund, 1995; Allen and Rai, 1996; Ruthenberg and Elias, 1996; Pastor, Perez, Quesada, 1997; Bikker, 1999;

and Sheldon, 2001, among others). This approach has recently come under suspicion because it neglects environmental factors such as market conditions, regulations and market structures, which may differ across countries and are beyond the control of firm managers. For instance, Dietsch and Lozano-Vivas, 2000; Bikker, 2001; Chaffai et al., 2001; Lozano-Vivas, et al., 2002; Casu and Molineux, 2003 and Weill, 2007 among others, show that the environmental conditions affect (and explain) the efficiency scores of the cross-country banking analysis.

All those studies help to understand how efficient or inefficient the European banking industries are, however they do not portrait enough information for explaining the potential that banks of each European country have for competing abroad or expanding cross-border activity. Lozano-Vivas et al. (2001) work takes a first step in this direction because it asks what happens if a firm in one country were to face the environmental conditions of another country. One important conclusion obtained by those authors were that advantageous (adverse) environmental conditions are a positive (negative) aid for cross-country banking activity. The present paper attempts to improve the new direction of research started by Lozano-Vivas et al, (2001). In particular, we are interested to know whether larger obstacles to cross-border banking activities exist in Europe or not. In others words, the paper attempts to know the potential advantages that the European banks could account for if they would expand their cross-border activity. To cover this goal we propose a new methodology which allows to systematically analyzing the efficiency advantages or disadvantages that banks can obtained if they decide to operate in any other country, by considering the availability of banking technology as well as each country specific environmental conditions. Two main issues differentiate this new methodology from the methodology used in Lozano-Vivas et al, (2001): (i) the new methodology proposed in the present paper allows to disentangle technological gap and environmental gap when banks decide to move from their own country to a certain foreign country, and (ii) instead of using a common frontier for all the countries of the sample, the new methodology defines a common frontier for each pair of selected countries, i.e., the own country and the selected foreign country. We perform pairwise comparisons because we consider this procedure more accurate than incorporating all the sample countries to the model. In fact, the frontier based on all the countries instead than in two countries will underestimate the efficiency scores of any of the banks belonging to the pair of selected countries.

3. Methodology

To cover the main goal of this paper, i.e. to predict the performance of the cross-country banking activity across European countries, we measure the cross-border gap (disentangling into technological and environmental gap) associated to the "average bank" of country m that decides to start operating in country n. For this purpose we resort to four different DEA frontiers as explained below. We consider always VRS (variable returns to scale) radial DEA models due to the presence, in each country, of small, medium and large size banks, i.e., we only use BCC models (Banker et al., 1984). We further select the input orientation (maximal radial reduction of inputs or resources while maintaining the outputs at their original levels) and get, for each model, positive efficiency scores less or equal than 1.

First, we make an internal comparison of all the banks of each country obtaining their internal performance. In this case, the efficiency of each bank i of country m, $\theta_{m,i}$, is evaluated by means of a BCC model with banking inputs and outputs, called "internal model" and denote by I(m). Hence, the frontier associated to I(m) represents the technology of the banks of country m, and I(m) evaluates the domestic banking efficiency of any bank i of country m, $\theta_{m,i}$. Similarly, and resorting to I(n), we evaluate the domestic banking efficiency of any bank j of country n, $\sigma_{n,j}$. At this level, the efficiency score assigned to the average bank that represents country m, $\theta_m(I)$, is simply the average of the efficiency scores $\theta_{m,i}$. Similarly, for country n, we define $\sigma_n(I)$ as the average of $\sigma_{n,j}$. As a summary, in our first level, we consider two BCC input-oriented models, I(m) and I(n), with the same set of banking variables but with completely different units to be rated. I(m) allows us to assign a domestic banking efficiency score to country m, $\theta_m(I)$, while I(n) performs the same task for country n and allows us to define $\sigma_n(I)$.

As said before, we are interested in measuring the performance of the average bank of country m, when it starts operating in a different country n. In this paper we have decided to perform pairwise comparisons of countries, as Berg et al. (1993) did, because we consider this procedure more accurate than incorporating all the sample countries into the same model (as we did in Lozano et al., 2002) . In fact, the frontier

based on all the countries instead than on two specific countries underestimates the efficiency scores of any of the banks of the pair of selected countries.[1]

For each pair of selected countries, m and n, the pairwise comparison is performed by means of two models, known as the basic model, B(m,n), and the complete model, C(m,n). Both models evaluate the same set of units, precisely all the banks of countries m and n, but differ in the set of considered variables. In fact they are nested model. While the basic model considers only the five banking variables as any internal model does, the complete model adds to the set of banking variables the set of environmental variables, entered as non-discretionary inputs. Therefore, in our second level, we are able to assign basic scores both to country m, $\theta_m(B)$, and to country n, $\sigma_n(B)$, defined as the average basic scores of the banks of m and of the banks of n. Finally, in our third level and after solving C(m,n) we define similarly the complete score of country m, $\theta_m(C)$, and of country n, $\sigma_n(C)$. The complete model allow us to compare the banks of countries m and n on an equal footing, after accounting both for the technological and for the environmental discrepancies. In fact, we are able to isolate a technological factor as well as an environmental factor in the transition from the internal model to the complete model through the basic model. Formally, and focusing initially on country m we have:

$\theta_m(B) \leq \theta_m(I)$

due to the relation between I(m) and B(m,n), and we can define a (positive) technological reduction factor, r_m , as

$r_m = \theta_m(B)/ \theta_m(I) \leq 1$.

Additionally, and due to the relation between models B(m,n) and C(m,n), we know that

$$\theta_m(B) \leq \theta_m(C)$$

and we can define an environmental raising factor, R_m , as

$$R_m = \theta_m(C)/\theta_m(B) \geq 1.$$

Combining the two last equalities we get

$$\theta_m(C) = \theta_m(I) \cdot r_m \cdot R_m .$$

Devoloping the same exercise for country n we get

$$\sigma_n(C) = \sigma_n(I) \cdot r_n \cdot R_n$$

[1] Lozano-Vivas et al. (2002) define a common frontier for cross-country banking comparison including all the country sample in the frontier.

where r_n is the technological reduction factor of country n (in its comparison with country m) and R_n is the environmental raising factor of country n.

Finally , if we want to forecast the domestic efficiency of the average bank of country m after moving to country n, σ_m , all we have to do is to move first forward from I(m) to C(m,n) and next backwards from C(m,n) to I(n). This is performed as follows:

$$\theta_m(I) \cdot r_m \cdot R_m \cdot (1/R_n) \cdot (1/r_n) = \sigma_m \ .$$

Now we can isolate the technological gap, TG_m , as well as the environmental gap, EG_m , when moving from country m to country n, as follows

$$TG_m = r_m \cdot (1/r_n) \ , \ EG_m = R_m \cdot (1/R_n) \ .$$

Last the cross-border gap, CBG_m ,when moving from country m to country n is simply defined as

$$CBG_m = TG_m \cdot EG_m \ .$$

It is easy to formalize the inverse movement from country n to country m, verifying that

$$CBG_n = 1/ CBG_m$$

Consequently, the expected domestic efficiency in country m of the average bank of country n is evaluated as

$$\theta_n = \sigma_n \cdot CBG_n \ .$$

4. Data and variables

The purpose of this section is to describe the main characteristics of the dataset corresponding to the banking and the environmental variables used in the empirical exercise. The information for the definition of the banking variables has been collected from Bankscope database. The pertinent information is obtained from the banks' balance sheets for year 2004.

Bankscope database reports balance sheet data at both the consolidated and unconsolidated levels for some banks. However, some banks only have consolidated statements and some others, only unconsolidated statements. To obtain a reliable sample, the data from Bankscope requires a valuable editing procedure. To avoid duplications and loss of information we adopt the following strategy: the consolidated bank holding company is used whenever more than one set of accounts is provided. This procedure is used by others authors (for instance, Bonin et al., 2005) and requires

to look bank by bank. After eliminating duplications, we end up with a total of 700 observations of commercial banks (in 2004) from eleven European countries.

The banking industries of Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain and the United Kingdom (UK) are analyzed. Our study is limited to these countries due to the small sample size associated to other European countries once our strategy of selection of institutions was applied. The final sample comprises 39 Austrian, 24 Belgian, 68 Danish, 96 French, 135 German, 26 Ireland, 119 Italian, 66 Luxembourgian, 27 Dutch, 51 Spanish and 49 British institutions.

The data for the definition of the environmental variables were built up from Eurostat (Money and Finance) and the European Banking Federation statistics.
All variables presented in value terms of local currencies were converted into a common currency (Euro) using the purchasing power parity hypothesis.

In specifying banking input and outputs, we follow the intermediation approach as suggested by Sealey and Lindley (1977). Three inputs (labour, funds and physical capital) are used to produce two outputs (loans and other earning assets). The three inputs reflect the three key groups of inputs in the bank production process. The inputs and outputs are measured in EUR million. Table 1 displays summary statistics for output and input variables by countries.

Table 1: Descriptive statistics of inputs and outputs variables

	AUSTRIA	*BELGIUM*	*DENMARK*	*FRANCE*	*GERMANY*	*IRELAND*	*ITALY*	*LOUXEMBOURG*	*NETHERLAND*	*SPAIN*	*UK*
Inputs											
Personnel expenses	139.153	948.179	217.708	589.202	482.403	519.874	317.586	280.715	881.004	397.400	991.905
Non-interest expenses	61.272	296.033	81.855	155.881	182.386	109.703	214.172	29.957	324.626	185.100	588.670
Funds expenses	83.264	306.317	58.532	142.612	229.104	107.223	262.628	25.306	296.070	228.282	763.034
Outputs											
Loans	4007.757	18702.000	5635.512	6619.288	7930.084	11899.113	10112.198	1600.143	18566.730	13674.260	30485.775
Other earning assets	3041.302	20844.054	4586.658	10728.309	12440.662	11503.568	6215.232	5560.245	16875.900	7009.894	19658.835

Notes: Figures in EUR million.
Source: Bankscope and authors' calculations.

The environmental variables used are measured at the country level, reflecting the specific country conditions of the environment where the banks of each country are

operating in. A set of ten environmental variables are used. Following Dietsch and Lozano-Vivas (2000) and Lozano-Vivas et al. (2002), those variables are selected to attempt to explain the economic conditions and the accessibility to banking services, as well as the bank structure and regulatory conditions of each country. For instance, the GDP per capita; salary per capita; and population density are used as indicators of country's economic performance and proxies of the characteristics of the demand and supply of banking services and products. Overall, those variables should be considered as indicators that reflect the main economic conditions in which banks exert their activities. To account with information about the country accessibility of banking services for customers, the GDP per branch, density of demand (deposit per square kilometer), deposit per branch and branch density (number of branches per square kilometers) are considered. Finally, the number of banks per inhabitants, the average capital ratio and the intermediation ratio are used as a set of environmental variables relaying the bank structure and regulation of each country banking industry.

Table 2 reports the average values of these environmental variables in 2004 for each European country.

Table 2: Environmental variables by country

Countries	V1	v2	v3	V4	V5	v6	v7	V8	v9	v10
AUSTRIA	97.071	0.011	0.028	2.866	52.472	55.053	0.052	0.073	0.108	1.287
BELGIUM	340.665	0.010	0.027	13.202	58.375	83.295	0.158	0.035	0.010	0.851
DENMARK	125.259	0.013	0.027	3.225	71.127	67.472	0.048	0.057	0.036	1.031
FRANCE	113.949	0.009	0.025	1.973	57.807	40.698	0.048	0.080	0.014	1.232
GERMANY	231.209	0.010	0.025	7.035	45.773	55.232	0.127	0.043	0.029	1.198
IRELAND	58.465	0.012	0.031	2.645	149.766	218.214	0.012	0.061	0.019	2.357
ITALY	192.152	0.007	0.024	2.177	44.034	21.200	0.103	0.088	0.013	1.697
LOUXEMBOURG	174.633	0.023	0.055	89.290	97.964	912.660	0.098	0.042	0.359	0.525
NETHERLAND	388.354	0.011	0.028	33.241	115.763	349.645	0.095	0.030	0.009	0.858
SPAIN	83.694	0.008	0.022	1.730	23.157	21.647	0.080	0.059	0.006	1.088
UK	244.571	0.013	0.027	13.966	141.897	301.700	0.046	0.066	0.006	0.916

Source: Eurostat, European Banking Federation Statistics and authors' calculations. v1=population density; v2=salary per capita; v3=GDP per capita; v4=density of demand; v5=GDP per branch; v6=deposit per branch; v7=branch density; v8=equity over total assets; v9=number of banks per habitant; v10=intermediation ratio**.**

5. Results

We start our empirical exercise by estimating the internal performance of each country banking industry by means of the internal comparison of all the banks of each single

country (see Table 3). Those results display the real domestic banking efficiency of each country banking industry. As usual, we assign to each country the average internal efficiency score of the banks of that country. Overall, the banking industry in Europe is performing with a country productive efficiency level ranking between 0.62 and 0.95. Although those results are not suitable for a direct cross-country comparison, we need them for controlling for the technology of each considered country so as to obtain the technological gap between pair of countries.

Table 3: Internal Efficiency

COUNTRIES	Efficiency scores
AUSTRIA	0.824
BELGIUM	0.952
DENMARK	0.881
FRANCE	0.791
GERMANY	0.733
IRELAND	0.832
ITALY	0.863
LOUXEMBOURG	0.778
NETHERLAND	0.797
SPAIN	0.853
UK	0.624

Because we are interested in analyzing the performance of a given bank in a different country, we perform pairwise comparison of countries. That requires to define two types of common frontiers, one with bank variables only and the other one with bank variables plus environmental variables. The first one leads to the definition of the so called basic model while the second one defines the complete model. Table 4 reports the bank efficiency for each of the sample countries by using the basic model taking always Spain as the second fix country in the pairwise comparison of countries. We have decided only to choose one country as fix country, arbitrary Spain, to present the results in an unfussy manner.

Table 4: Basic Efficiency Scores

COUNTRIES	Efficiency Score	SPAIN Efficiency Score
AUSTRIA	0.752	0.811
BELGIUM	0.813	0.836
DENMARK	0.820	0.799
FRANCE	0.710	0.822
GERMANY	0.627	0.767
IRELAND	0.811	0.762
ITALY	0.823	0.794
LOUXEMBOURG	0.716	0.831

NETHERLAND	0.691	0.837
UK	0.515	0.667

The results show that the efficiency scores of each country obtained from the basic model are lower than those obtained from the internal model of each country. This could mean that the technology availability in the two countries under comparison is different. However, estimated inefficiencies may be a combination of true managerial inefficiencies and frontier misspecification effects as economic environment, local regulation, and so on. This fact moves our attention to the estimation of the complete model where common frontier is defined now with banking variables jointly with environmental variables. We present our result of our complete DEA model in Table 5. As expected (see for instance, Lozano-Vivas, 2002; Weill, 2007 among others) when we introduce these variables into the model, the average efficiency scores improve in all the countries, except for the case of Austria and France that hold equal, with respect the scores obtained in the basic model. Observe that the improvements in the other 8 cases are as large as possible, since the complete efficiency scores reach the same level as the internal efficiency scores (see Tables 3 and 5).

Table 5: Complete Model Efficiency Scores

COUNTRIES	Efficiency Score	SPAIN Efficiency Score
AUSTRIA	**0.752**	0.853
BELGIUM	0.950	0.853
DENMARK	0.880	0.853
FRANCE	**0.710**	0.853
GERMANY	0.733	0.853
IRELAND	0.832	0.853
ITALY	0.863	0.853
LOUXEMBOURG	0.778	0.853
NETHERLAND	0.793	0.853
UK	0.624	0.853

After obtaining the internal, basic and complete efficiency scores for each country, we focused on determining the cross-country border gap. We perform two exercises: (i) to determine the border gap in efficiency when Spanish banks decide to expand cross-border activity in any European country and, (ii) the opposite movement, i.e., when the average bank from any of the other ten European country decides to move to Spain to perform its activity. To determine this gap we need to calculate the technological reduction factor of Spain with respect to the rest of European countries as well as the environmental variable augmentation factor to predict the efficiency behaviour of a

Spanish bank if it starts operating in country i (being i any European sample country). According to Section 3, those factors allow us to obtain the technological, environmental and the cross-border gap when a bank moves from Spain to any other European country, which in turn allow us to predict the new efficiency score in the new European country. Table 6 presents this information. The results suggest that Spanish banks do not modify their efficiency level if they decide to move to Belgium, Denmark, Germany, Ireland, Italy, Luxembourg and UK. The cross-border gap is equal to 1, Table 6, column 4. The explanation of those results are due to two reasons: (i) because Spanish banks account with a higher technology than Belgium, Germany and Luxembourg and, (ii) because Spanish banks should take advantages of the environmental conditions for banking activity if they decide to move to Denmark, Ireland, Italy or UK. On the other hand we observe that Spanish banks should improve their home efficiency if they decide to develop banking activity to the rest of sample countries (column 6 in Table 6).

Table 6: Prediction of cross-border movements of Spanish banks

Countries	Environmental Gap	Technological Gap	Cross-Border Gap	INTERNAL Efficiency of Spanish banks	CROSS-BORDER Efficiency of Spanish banks	INTERNAL Efficiency of foreign country banks
AUSTRIA	1.051	1.043	1.096	0.853	**0.935**	0.824
BELGIUM	0.873	1.145	1.000	0.853	0.853	0.950
DENMARK	1.005	0.994	1.000	0.853	0.853	0.880
FRANCE	1.038	1.074	1.114	0.853	**0.950**	0.791
GERMANY	0.951	1.051	1.000	0.853	0.853	0.733
IRELAND	1.091	0.916	1.000	0.853	0.853	0.832
ITALY	1.024	0.976	1.000	0.853	0.853	0.863
LUXEMBOURG	0.945	1.059	1.000	0.853	0.853	0.778
NETHERLAND	0.888	1.132	1.005	0.853	**0.857**	0.797
UK	1.055	0.947	1.000	0.853	0.853	0.624

Our methodology allows us to predict the competitive position than the entrant banks should have with respect to the incumbent ones by regarding the efficiency position that banks will obtain if they decide to perform banking activity outside. By comparing column 6 with column 7, Table 6, we observe that Spanish banks will over-perform in terms of efficiency to the banks of the rest of European countries, except for the case of Belgium, Denmark and Italy, if Spanish banks decide to move to those countries. Moreover, in another three cases, the efficiency of the Spanish banks working abroad will outperform the home efficiency (observe in column 6 the cases of Austria, France and Netherland).

Table 7 presents the prediction of the performance of the European banks, grouped by country, if they move to Spain to carry out their bank activity. Overall we are able to distinguish three different types of results: (i) Countries banks that will operate with higher efficiency than the Spanish banks. Such is the case of Belgium, Danish and Italian banks. (ii) Countries banks that will operate with less efficiency level than the Spanish banks. The latter group includes the rest of the countries, i.e. Austrian, French, Germany, Ireland, Luxemburgian and Dutch banks. (iii) Countries that will compete with less efficiency levels than in their own country, as is the case of Austria, France and Netherlands.

Table 7: Prediction of cross-border movements of European banks to Spain

Countries	**CROSS-BORDER Activity of European banks**	**INTERNAL Efficiency**	**INTERNAL Efficiency Spanish banks**
AUSTRIA	0.752	0.824	0.853
BELGIUM	**0.950**	0.950	0.853
DENMARK	**0.880**	0.880	0.853
FRANCE	0.710	0.791	0.853
GERMANY	0.733	0.733	0.853
IRELAND	0.832	0.832	0.853
ITALY	**0.863**	0.863	0.853
LUXEMBOURG	0.778	0.778	0.853
NETHERLAND	0.793	0.797	0.853
UK	0.624	0.624	0.853

Putting together our results we can draw some insight about the adversity or advantages that European banks could have in exerting activity in foreign countries and to explain the slow integration of the European banking industry. The results obtained give an appropriate knowledge and understanding of each of the considered European banking markets, revealing some insight about how foreign banks could foster domestic comparative advantage and create a niche in foreign countries. In particular, it seems that the host-nation banking performance, the differences in technology availability and the environmental conditions could work as barriers in cross-border banking activity in Europe. In particular, we can observe in Figure 1 that Spain accounts with a high banking internal efficiency (the fourth highest), and, Spanish banks are in a good position competing in Spain with foreign European banks. Our first conclusion is that internal productive efficiency is a barrier to new entries. In fact, only the three countries with higher banking internal efficiency score than Spain (Belgium, Denmark and Italy)

end up with a cross-border efficiency higher than the banking internal efficiency of Spain (see Table 7). In the three cases, the cross-border gap equals 1, that is, the technological gap and the environmental gap counteract and have no effect at all. In the case of Belgium, only the technological gap is favourable to Spanish banks, while in the cases of Denmark and Italy only the environmental gap benefits Spanish banks (see Table 6).

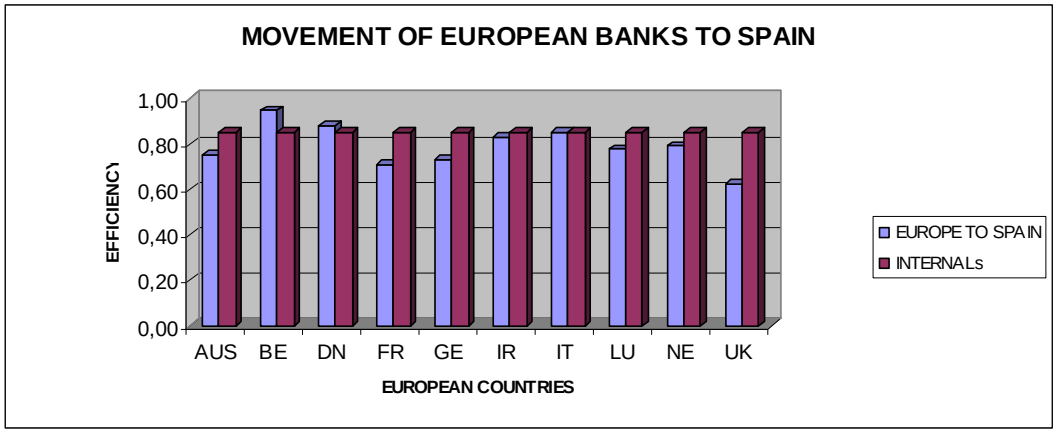

Figure 1: Internal efficiency of Spanish banks and cross-border efficiency of European banks in Spain

Figure 2 shows that only Irish, Danish and Italian banks have technological advantages over Spanish banks, and the environmental conditions in Spain are not good enough in order to give advantages in performance to foreign European banks. So, those results could suggest that the success of cross border deal depends on the ability to realize advantages in technology and/or environmental conditions.

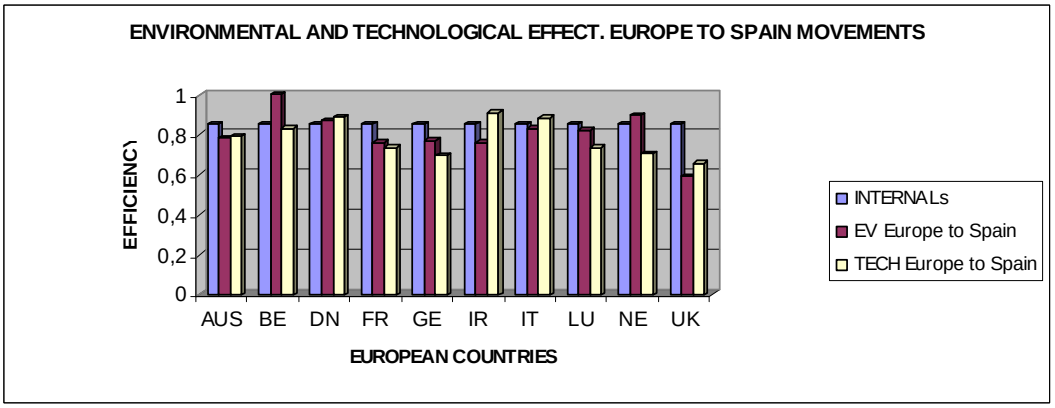

Figure 2: Environmental and Technological effect of European to Spain movements

6. Conclusions

The development of cross-border banking activities plays an important role to explain banking integration. With a view to supporting further progress in European banking integration this paper attempts to analyze whether performance, banking technology and environmental conditions behave as barriers for cross-country banking activity in Europe. To cover this goal, we present a new approach that allows to isolate both the effect of the technology and the effect of the environmental factors so as to predict the efficiency performance of the average bank of a country if it starts operating in a different European country.

Our findings show that host-nation banking performance, the differences in technology availability and the environmental conditions act as barriers to deter cross-border banking activity. It seems that the success of cross border deal depends on the ability to realize advantages in technology and/or environmental conditions. Besides, the average level of banking internal efficiency is a good shield against the cross-border competition.

In the paper is analyzed the cross-border performance of the Spanish banks as an illustrative case. In the considered sample the cross-border gap is always 1 or larger than 1, which means that Spanish banks will behave at least as well as in Spain when moving to any other of the considered European countries. Nevertheless in three cases (Belgium, Denmark and Italy) Spanish banks will not reach the internal efficiency score of the host countries.

Although it is completely clear that technology and environmental conditions act as barriers to deter cross-border competition, the values of the cross-border gaps for Spain show that in 7 cases the two influences counteract and do not affect the movement of the Spanish banks, while in the other 3 cases the positive influence is always smaller than a 10% increase in the efficiency.

Another additional finding, in the case of Spain, is that the only three countries that end up with a cross-border efficiency score higher than the average internal efficiency score of Spanish banks are exactly the three countries that have average banking internal efficiency scores larger than Spain, i.e., Belgium, Denmark and Italy (see Table 7).

Those results could suggest that the average level of internal efficiency is a good safeguard to cross-border competition.

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